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TEACHERS AND MICRO-COMPUTERS: A COMPARISON OF THE PAPT AND CEQ SURVEYS

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TEACHERS AND MICROCOMPUTERS:
A comparison of the PAPT and CEQ surveys

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TABLE OF CONTENTS

INTRODUCTION	i
1. SITUATION IN THE PAPT SCHOOLS	1
1.1 Access to Microcomputers	1
1.2 Training Received	4
1.3 Pedagogical Uses of the Computer	7
2. TEACHER PERCEPTIONS REGARDING COMPUTERS	11
2.1 Teacher Interest in Learning How to Use Computers for Various Pedagogical Purposes	11
2.2 General Opinions	14
2.3 Teachers' Opinions of the Impact of Computer Use on their Work	17
2.4 The Users: Perceived Effects on their Teaching Effectiveness and Workload	18
3. DIFFICULTIES ENCOUNTERED	21
3.1 Facilities Offered by the School Board	21
3.2 Educational Software	22
3.3 The Main Difficulties	23
4. CONCLUSION	25
REFERENCES	28

INTRODUCTION

In May 1987, the PAPT issued a preliminary report of its survey on microcomputers in schools, conducted among its members from December 1986 to January 1987 on the state of the implementation of microcomputers in the schools(1).

The survey used an adapted and translated version of a questionnaire which had been previously utilized by CEQ members in February 1985. The CEQ study(2), to which the Ministry had contributed financially, had been, at the time, particularly useful in assessing the state of the educational use of computers in the Catholic school boards.

The new version of the survey, carried out, this time, in the Protestant school boards, completes the general picture of the use of computers in our schools and provides an opportunity to evaluate its evolution during the last two years.

In 1985, the different support measures of the Ministry's Microcomputer Implementation Plan had barely been implemented. In 1987, the acquisition of equipment included in the Ministry's Plan was put on hold. The two surveys measure the same realities at two distinctly different points in time, among teachers who have not shared the same experiences with computers. The language barrier made it impossible for francophones to have access to all the English software and documentation.

Among all observations, it is the change in the educational use of computers that occured during the intervening two years which stands out in the comparison between the results of the PAPT and CEQ surveys.

Aside from the two year interval, we tried to consider in our analysis all the possible differences and similarities between the two groups of teachers surveyed. Thus, this document is not merely a strict comparison of the data collected, but it is also an interpretation of the meaning of the differences and similarities observed.

Before proceeding with the comparison, the main parameters of each survey will be outlined. Each study addressed representative samples selected from the list of teacher members. The sampling fractions are comparable and the response rate is impressive considering the scope of the questionnaire as well as its administration through mailing. The data concerning these factors are the following:

	PAPT 1987	CEQ 1985
Sample	n = 577	n = 5081
Sampling Fractions	11%	10%
Response Rate	67%	60%
Analysis sample	n = 382	n = 2832

In order to assist the reader who wishes to refer to the original reports on the two surveys we have adopted the structure and organization of the PAPT report to which is added the CEQ data in the tables.

The wording found in the tables conforms to that found in the original PAPT report.

In the analysis of the situation regarding microcomputers in our schools, availability of machines for the teachers' use, for training purposes and for the various pedagogical uses will be examined first. The second part deals with the perceptions and attitudes of three categories of respondents regarding microcomputers: all teachers in general, non-computer users and users. Thirdly, it will be noted that the difficulties encountered by the users remain fundamentally the same in both surveys, despite the development of computer use in the schools. We will come back to this finding in the conclusion.

1. SITUATION IN THE PAPT SCHOOLS

1.1 Access to Microcomputers

Two years have passed since the CEQ survey. In February 1985, 60% of CEQ members were working in schools equipped with microcomputers. At that time, the Ministry had allotted only half of the 13 000 machines subsidized between 1983-1984 and 1985-1986([3]). Therefore, a greater availability of machines in the Franco-Catholic schools can be expected today.

In the PAPT survey, 88% of the respondents acknowledged the presence of microcomputers in their schools. This proportion would probably not have been reached among CEQ respondents had the 1985 survey been conducted today. In fact, in the DTE-DGR survey of February 1986 ([4]), the proportion of school boards that had equipped all their schools was higher for the anglophone sector boards than for francophone (92% and 72%, respectively). However, it should be noted that the anglophone milieu had a head start in the introduction of microcomputers in schools prior to the MEQ's intervention.

The language factor was certainly an important obstacle in the development of the educational use of computers in the francophone education sector. The development of pedagogical applications of microcomputer in schools where the language of instruction was English was favoured since these schools had access to American hardware and software. Nervertheless, the Quebec government's choice of an IBM-compatible machine and the financial guarantees that the MEQ offered to the school boards have helped those where French is the language of instruction catch up with computer implementation.

At the time of the CEQ survey, most of the Ministry's allocations were used for those computers that were required for Introductory Computer Science courses (ICS) offered in high schools. This could help explain the high number of elementary and junior high school teachers whose schools were not yet equipped.

In the CEQ findings, a correlation was found between school size and the presence of microcomputers. This connection, already observed in 1983 in the United States by J. Becker of the Center for Social Organization of Schools at the Johns Hopkins University(5) and which is typical of the implementation phase of a new technology, is not found in the PAPT survey data. The PAPT findings give a good picture of the extent of microcomputer implementation in Quebec schools. In fact, the machines allotted by the Ministry since the CEQ survey were designated for pedagogical applications which subsequently made it possible for the elementary and junior high middle schools to equip themselves. Moreover, according to microcomputer implementation coordinators in the Catholic school boards(6), the correlation observed in 1985 no longer applies today.

The PAPT findings do confirm that the first phase of the Implementation Plan has been completed in Quebec schools. Thus, each school has at least one computer for teaching purposes. This allotment does not imply, of course, that there are enough computers to satisfy the teacher's needs.

TABLE 1: PROPORTION OF TEACHERS IN SCHOOLS EQUIPPED WITH MICRO-COMPUTERS, ACCORDING TO THE LEVEL AND SIZE OF SCHOOL.

TEACHING LEVEL	SIZE OF SCHOOL	CEQ 1985 %	PAPT 1987 %
ELEMENTARY	Small (1 - 10 teachers)	35%	86%
	Medium (11 - 24 teachers)	46%	90%
	Large (25 + teachers)	53%	81%
	ALL ELEMENTARY	45%	87%
SECONDARY	Small (1 - 40 teachers)	60%	90%
	Medium (41 - 125 teachers)	82%	87%
	Large (126 - 300 teachers)	82%	100%
	ALL SECONDARY	79%	89%
	COMBINED ALL SCHOOLS	60%	88%

Note: The categories of school size are the same in both the CEQ and PAPT reports.

1.2 Training Received

From 1983 to 1984, in addition to the Computer Assisted Instruction (CAI) courses offered by the faculties of education of our universities, the MEQ planned, organized and subsidized several upgrading activities for teachers.

The "Intensive Training" programme, lasting 6 weeks or 180 hours, has been offered since 1983 to subject consultants or teachers who were chosen by their school boards to be "teacher instructors". The aim of the programme, carried out in 1983-1984, was to ensure the presence of at least one resource person in each school board capable of supporting, stimulating and counselling teaching personnel who wished to use computers for educational purposes.

The "Light Training" programme consists of 10 days or 50 hours and was created by the Ministry to support the action of the teacher-instructors.

The "Introductory Workshops" ((1) to (3) days) are meant to sensitize and familiarize teachers through an initial contact with computers.

Other types of training offered to teachers include: self-teaching, internships in industries, courses given by the hardware manufacturers, televised programmes and club or association activities.

On the whole, the teachers' participation in these training activities demonstrates their high interest regarding their acceptance of this new technology.

In 1985, 51% of CEQ teachers had received some form of training in the pedagogical use of microcomputers. In 1987, this proportion reached 67% for the PAPT teachers.

The "Introductory Workshops" were taken by a larger proportion of PAPT members than CEQ teachers. The two years separating the surveys can explain why 31% of PAPT teachers participated in these sessions as opposed to 19% of CEQ teachers.

The other type of training most widely used was that offered by the colleges and universities. The ratio of participants is still greater among PAPT teachers. However, the difference between the two groups is less than for the "Introductory Workshops". Again, keeping in mind the two-year separation between the surveys, the fact that no more than 25% of PAPT members took the collegial or university programmes tends to imply that the demand for this type of training has now levelled off.

The question pertaining to "Light Training" (Q.10) was formulated in such a way as to include the "Light Training" offered by the Ministry, which had subsidized the school boards in order to encourage teacher participation.

Few school boards applied for subsidies intended for this 10-day programme due mainly to the fact that teachers could not be released for that purpose. In 1985, only 11% of CEQ teachers participated in this programme. The fact that a small proportion of PAPT teachers (15%) had enrolled for "Light Training" in 1987 confirms the relative unpopularity of this formula with the school boards.

In fact, in the anglophone milieu, there were, according to the Direction des services éducatifs aux anglophones, almost no 10-day sessions organized by the school boards. This leads us to think that the respondents to this question have "estimated" their own cumulated training activities to be the equivalent of a 10-day course([7]).

TABLE 2: PROPORTION OF TEACHERS TAKING ONE OR MORE TRAINING COURSES ACCORDING TO TEACHING LEVEL AND THE DEGREE OF SATISFACTION OF EACH

	INTRO. WORKSHOP 1 - 3 DAYS		LIGHT TRAINING 10 DAYS OR 50 HRS		COLLEGE OR UNIVERSITY	
	CEQ 1985	PAPT 1987	CEQ 1985	PAPT 1987	CEQ 1985	PAPT 1987
PROPORTION	19%	31%	11%	15%	19%	25%
SATISFACTION	%	%	%	%	%	%
Excellent	20	14	18	12	22	22
Good	45	62	46	63	48	68
Poor	24	13	25	12	21	4
Unsatisfactory	12	11	11	12	9	4

What is striking from the analysis of the three main types of training is the difference in the degree of satisfaction. The CEQ teachers were more critical of these programmes than their PAPT colleagues. Some 36% of CEQ teachers said they were "poorly" satisfied or clearly "unsatisfied" with the training they received in the "Introductory" and "Light" programmes; whereas this proportion was 24% among PAPT teachers.

Whereas these differences are even more striking for those teachers who followed a college or university programme. The proportion of "unsatisfied" among CEQ teachers represented 30%; among PAPT members this proportion is only 8%.

Time is again the main factor in accounting for these differences. In 1985, local training initiatives in the francophone school boards had barely started; by 1987, training programmes were set up and functionally operating.

The main cause of dissatisfaction among francophone teachers in 1985 was the emphasis on BASIC programming in the training courses. To begin with, many felt it was not useful from a pedagogical point of view. In addition, the teachers had difficulty with the programming language being English.

PAPT teachers do not have a similar language barrier. As well, rapid changes in training practices have placed a greater emphasis on pedagogical applications, rather than on introduction to programming language. The proportion of "satisfied" teachers would probably be greater in 1987, were the CEQ survey carried out today.

1.3 Pedagogical Uses of the Computer

In comparing the results of both studies, it should be understood that each reflects a different stage of development in the implementation of microcomputers in the schools. In order to use the computer in the classroom effectively, it is not sufficient to have the basic training. One also needs to have a sufficient number of machines in a context appropriate to the promotion of pedagogical uses.

At the time of the CEQ survey, although 51% of the teachers stated that they had acquired some training, only 11% used the computer for pedagogical purposes. The trained teacher/user teacher ratio was 5 to 1. However, it must be taken into account that at the beginning of 1985 the school boards were just receiving their first MAX 20E machines.

In 1987, 67% of PAPT members obtained some sort of training while 38% actually used computers for pedagogical purposes. Thus, there were 2 trained PAPT teachers for every user, a different situation from that among CEQ teachers in 1985.

In acknowledging these differences, do the various computer uses differ between the two surveys?

The tendency at the elementary level to consider the computer as a pedagogical tool, already noted in the CEQ survey, was even more pronounced in the PAPT survey. In 1985, 77% of CEQ teachers who had used computers confirmed using them for pedagogical support in one or more disciplines. In 1987, this proportion reached 87% of PAPT teachers surveyed.

In elementary schools, programming and class preparation, which ranked second and third respectively in the CEQ survey, are of equal importance in the PAPT survey.

At the high school level, both surveys show that microcomputers were more commonly used for class preparation. Therefore, there is a marked difference in the ways teachers at the primary and secondary school levels use the microcomputers.

Concerning their choice of applications, class management ranked second in the CEQ survey, while pedagogical support was second in the PAPT survey. This difference can be explained in part by the fact that more computer science (ICS) high school teachers participated in the CEQ survey. Moreover, the availability of software undoubtedly contributed to this difference.

TABLE 3: USE OF COMPUTERS FOR VARIOUS PEDAGOGICAL PURPOSES ACCORDING TO LEVELS

Purpose	ELEMENTARY		SECONDARY	
	CEQ 1985	PAPT 1987	CEQ 1985	PAPT 1987
Teaching programming at the elementary level	44%	32%	-	14% *
Teaching the course: Introduction to Computer Science at the secondary level	-	-	40%	28%
A teaching aid in one or many disciplines	77%	87%	41%	61%
The evaluation of student learning	23%	23%	36%	31%
The administration of the class (report cards, absences, etc.)	8%	10%	56%	42%
The activities of the computer club	10%	18%	25%	20%
Technical-Vocational courses	-	3% **	27%	25%
Class preparation (word processing, etc.)	25%	34%	62%	84%

* Here the term "Elementary level" may have been misunderstood and interpreted as meaning "Elementary programming" by the high school teachers.

** Among those that responded, there are teachers that find themselves in schools offering elementary and secondary teaching as well as vocational education.

Microcomputer Ownership

The authors of the CEQ survey viewed ownership of a personal microcomputer as a sign of teacher acceptance and familiarity with the new computer technologies. The survey showed that 23% of the teachers owned one.

The first personal computers (from PET to COCO, including VIC 20, TI 99 and Apple II's) were more readily available to anglophones than to francophones, since the former did not have language difficulties. At the beginning of 1980, the main preoccupation of francophone users of this equipment was to be able to put accents in their French text.

More recently, "educational prices" offered by the manufacturers, as well as the constant increase in the amount of software available in English, resulted in encouraging more PAPT members to purchase a microcomputer. Despite these positive factors, only 25% of PAPT teachers owned a personal computer.

In this context, why is there such a small proportion of anglophone owners in 1987? It could be the case that the boom in purchasing these types of computers has levelled off and that 25% represents a standard ratio of ownership. The buyers of first-generation computers, with the exception of Apple II's, have either sold or replaced them with better performing machines.

TABLE 4: TEACHERS WHO OWN A MICROCOMPUTER, ACCORDING TO SEX AND SCHOOL LEVEL.

TEACHING LEVEL	SEX	CEQ (1985)	PAPT (1987)
Elementary	F	22%	19%
	M	18%	24%
Secondary	F	23%	27%
	M	31%	27%
Combined	F	19%	22%
	M	29%	25%
TOTAL		23%	25%

2. TEACHER PERCEPTIONS REGARDING COMPUTERS

2.1 Teacher Interest in Learning How to Use Computers for Various Pedagogical Purposes.

Of the eight types of computer applications mentioned in the questionnaire, more than half of those who answered in both the CEQ and PAPT survey said they were either "interested" or "very interested" in learning these.

TABLE 5: PERCENTAGE OF ALL TEACHERS INTERESTED IN LEARNING HOW TO USE THE MICROCOMPUTER FOR VARIOUS PEDAGOGICAL PURPOSES. PROPORTION OF THOSE WHO ANSWERED "INTERESTED" OR "VERY INTERESTED".

	PAPT 1987	CEQ 1985
Support for regular teaching	72%	79%
Method of solving problems for students	58%	70%
Educational games to reward students	48%	70%
Student marks/absence	50%	63%
Simulation of Scientific & Natural phenomena	46%	75%
Tests for pupil evaluation	54%	72%
Basic exercises for all	69%	72%
Remediation	70%	75%

The interest of PAPT and CEQ teachers seems constant for at least three uses: support for regular teaching; remedial work; and basic exercises for all. These are the only three applications for wich both PAPT and CEQ teachers shared a high level of interest.

An average of 70% of CEQ teachers have a marked interest for the other five types of computer applications. In the PAPT survey, the interest shown in these types of applications was always more moderate.

If the latter seem more selective in their interests, it is because there are more trained teachers and more users. Perhaps, they also have a better understanding of the limitations and of the real capacity of today's machines.

Moreover, their answer to the ninth statement in table 7 confirms the interest of PAPT teachers in the use of the computer for children with learning difficulties. Some 75% thought that the use of microcomputers could enhance the academic success of students with learning disabilities. CEQ did not share this point of view as strongly .

Non-computer Users: Their Interest in Using Computers

The differences observed thus far between the PAPT and CEQ findings are mostly related to the evolution that has taken place since the micro-computer implementation process began in the schools.

CEQ teachers were questioned at the very beginning of the Implementation Plan. PAPT teachers expressed their opinions when the Plan was being re-evaluated, at least in terms of hardware investment. The Ministry in 1986-1987 postponed the subsidies for the purchase of more equipment. Yet, the importance with regard to the eventual utilization of computers is the same for non-users in both studies, despite the different contexts.

TABLE 6: THE INTEREST OF NON-USERS IN USING MICROCOMPUTERS IN THE CLASS

	PAPT 1987 %	CEQ 1985 %
Very Interested	24	27
Interested	44	41
Not very interested	22	20
Not at all interested	7	9
No opinion	3	3

2.2 General Opinions

In the CEQ survey, the teachers were asked to agree or disagree with 15 statements regarding computer education. These statements were taken up in the PAPT survey, allowing for a comparison between responses based on a two-year interval.

The Impact on School

Both CEQ and PAPT teachers believed that the introduction of the computer would have a major impact on school life. In similar proportions (81% CEQ, 85% PAPT), they believed that teachers should, within a few years, be able to use the microcomputer for pedagogical purposes. Moreover, fewer PAPT teachers thought that the microcomputer could not be useful for the subjects they teach. Also, few of them held the opinion that the computer was a "fad" which would pass (44% CEQ, 26% PAPT).

With respect to educational objectives, more than 90% in both sub- populations agreed that, by the end of high school, all students should be aware of the impact of microcomputers on society. Programming was considered less important in 1987 by PAPT teachers (46%) than it was in 1985 by CEQ teachers (57%).

Lastly, proportionally fewer PAPT teachers believed that teachers would lose their jobs as a result of the introduction of microcomputers in their workplace. In general, it was not believed that computers would create new jobs in the schools. However, the number of those who responded and saw job creation as a possibility was higher than the number of those who expressed fear over losing a job.

The Introduction of Microcomputers

Two statements dealt specifically with the conditions under which computers were introduced into the schools. First, among both CEQ and PAPT members, only one teacher out of three considered that the Ministry of Education and the school boards had given the necessary support for this introduction. This is a somewhat paradoxical response considering that the English educational sector has made greater efforts than the French sector to support the introduction of computers in schools([8]). It seems as if this effort is either not perceived or acknowledged by the teachers or it could be that the desire to introduce computers is so great that their reaction does not take into account the considerable support they have already received.

Secondly, it is the teachers' participation in the introduction of computers that differentiates the two groups. In 1985, barely 39% of CEQ teachers confirmed this participation. In 1987, 58% of the PAPT members stated they had participated in this implementation.

Work and Society

A majority of teachers in similar proportions (CEQ 59%, PAPT 57%) felt that many jobs will be lost due to the introduction of new technologies in the workplace. However, they also believed (CEQ 64%, PAPT 68%) that work would generally be more interesting.

In short, few differences were noticed concerning the general opinions between CEQ and PAPT teachers. The results are similar for 8 out of 15 statements. The differences noted concerned statements relating to a negative situation with which fewer PAPT teachers agreed. This conclusion is confirmed by 4 out of the 7 remaining statements.

In addition to the difference mentioned above, it should be noted that a larger proportion of PAPT teachers saw the computer as a tool particularly adapted to help students with learning disabilities (56% CEQ, 75% PAPT) and that fewer PAPT teachers believed that, by the end of high school, all students should have learned to programme computers (CEQ 57%, PAPT 46%).

TABLE 7: Teachers opinions concerning microcomputers in general. Proportion of respondents who agree or strongly agree with each item

	PAPT 1987	CEQ 1985
The usefulness of the microcomputer will depend on what we do with it.	98%	98%
Microcomputers used as a pedagogical tool is a fad which will pass.	26%	44%
I don't think the microcomputer can be useful for the subject (s) I teach.	18%	35%
Teachers should, within a few years, be able to use the microcomputer for pedagogical purposes.	85%	81%
All teachers should be aware of the impact of microcomputers on society (employment, private life).	88%	84%
The Ministry of Education and the school boards are giving the necessary support for the introduction of microcomputers in the school.	35%	36%
In my school teachers are participating in the introduction of microcomputers in the school.	58%	39%
The purpose of introducing microcomputers in the school is mainly to support private enterprise.	10%	34%
I think that the introduction of microcomputers will enhance the academic success of students who have learning disabilities.	75%	56%
By the end of high school, all students should be aware of the impact of microcomputers on society (employment, private life, etc.).	92%	90%
By the end of high school, all students should have learned programming.	46%	57%
Some teachers will lose their jobs due to the general utilization of microcomputers for pedagogical purposes.	17%	28%
Numerous jobs will be created to support the utilization of microcomputers in the school.	40%	38%
Many workers will lose their jobs due to the introduction of new technologies in the workplace.	57%	59%
The introduction of new technologies in the workplace will generally make work more interesting.	68%	64%

2.3 Teachers' Opinion of the Impact of Computers on their Work

The teachers were asked to point out whether the growing use of microcomputers would increase or decrease each of the seven aspects of their work listed in Table 8.

TABLE 8: THE OPINION OF TEACHERS AS TO THE IMPACT OF THE GROWING USE OF MICROCOMPUTERS IN THEIR PLACE OF WORK

A= Increase C= No effect
B= Decrease D= Don't know

ASPECTS		A	B	C	D	
Autonomy at work	%PAPT	24	4	45	26	100%
	%CEQ	23	10	35	31	100%
Job satisfaction	%PAPT	37	3	38	21	100%
	%CEQ	34	6	28	32	100%
Effectiveness of Teaching	%PAPT	48	1	26	25	100%
	%CEQ	44	3	20	34	100%
No. of teachers employed	%PAPT	7	10	44	38	100%
	%CEQ	7	22	28	42	100%
Students' interest in learning	%PAPT	64	2	15	20	100%
	%CEQ	57	4	11	28	100%
Amount of your workload	%PAPT	32	12	32	25	100%
	%CEQ	45	10	16	29	100%
Develop students' autonomy	%PAPT	49	2	16	33	100%
	%CEQ	51	4	14	31	100%

These questions were addressed to all teachers, whether or not they were computer users. In fact, only the actual users have had the necessary experience to judge the effects that the introduction of computers has on their work. That actual users were among the respondents may have influenced the opinions expressed by PAPT teachers, especially since 38% of them are users compared with only 11% of CEQ teachers. Moreover, the proportion of teachers who had received training was greater in the PAPT group (67%) than it was in the CEQ group (51%).

In considering these two factors, it was expected that the results of the two surveys would show a greater contrast. Yet, the teachers'perceptions are similar for all the factors measured, with the exception of workload. Despite the fact that PAPT teachers had had more experience with computers than their CEQ colleagues in 1985, it is puzzling that the proportion of teachers with no opinion as to the effects (increase - decrease) on any of the measured factors was as great in 1987 among PAPT teachers as it was in 1985 among CEQ teachers.

2.4 The Users: Perceived Effects on their Teaching Effectiveness and Workload

The above-mentioned factors (more trained teachers and a greater number of users) as well as the greater experience of PAPT users could explain their contrasting opinions.

In both studies, a majority of users consider that their workload was increased, their teaching methods had been modified and that their effectiveness had improved.

TABLE 9: OPINION OF USERS AS TO THE EFFECTS OF COMPUTER USE ON THEIR WORK

EFFECTS	PAPT 1987	CEQ 1985
Increased workload	51%	65%
Increased autonomy at work	39%	32%
Increased teaching effectiveness	70%	59%
Modified way you teach	54%	63%

These three main effects were indicated by CEQ members in similar proportions, varying from 59% to 65%. The opinion of PAPT users is more precise. The main effect for PAPT users was the increase in effectiveness of their teaching (70%). The increase in workload and modified ways of teaching placed second.

In fact, the only factor which did not rally the support of a majority of teachers was the increase of autonomy at work. However, it should be pointed out that of all the factors mentioned, this concept was the least clear. Have the users made a connection between their autonomy at work and the numerous obstacles they encounter in using computers? In a context(*) where the user is rather dependent on resources, both human and material, it cannot be expected that the majority of users would feel more autonomous at work.

According to the users, as many from PAPT as from CEQ, acceptance of the computer in the classroom had a positive impact on their students' motivation and their interest in the subject being taught.

In 1985, nearly 3 out of 4 CEQ teachers recognized that this use had a positive influence on teacher-student and student-student relations. In 1987, PAPT respondents perceived fewer positive effects; however, they were more numerous in judging classroom computer use as having a minimal effect on these relations.

The opinions of PAPT and CEQ teachers differ on the impact of computers on learning. When speaking of students who have learning disabilities or who are gifted, PAPT teachers are proportionally more numerous in expressing a precise opinion and in considering that computer use has a positive impact on these two groups.

* See Table 13

TABLE 10: OPINIONS OF USERS AS TO THE EFFECTS OF MICROCOMPUTERS UPON THE TEACHING

A= Positive effect C= Little effect
B= Negative effect D= Don't know

ELEMENTS		A	B	C	D	
General motivation for schools	%PAPT	77	1	17	6	100%
	%CEQ	74	1	16	10	100%
Interest in subject-content	%PAPT	68	0	24	7	100%
	%CEQ	73	0	15	11	100%
Teacher-student relations	%PAPT	55	-	35	9	100%
	%CEQ	74	-	17	8	100%
Student-student relations	%PAPT	51	1	32	18	100%
	%CEQ	64	1	23	12	100%
Success in the subject content for students with difficulty	%PAPT	49	1	30	19	100%
	%CEQ	40	2	25	33	100%
Success in the subject content for students who have more facility	%PAPT	61	0	18	20	100%
	%CEQ	55	0	18	27	100%
Autonomy of students in their learning process where they use micro-computers	%PAPT	67	0	20	13	100%
	%CEQ	72	1	15	13	100%

3. DIFFICULTIES ENCOUNTERED

3.1 Facilities Offered by the School Board

1985 was the second year of the Implementation Plan. Thus, it should not be surprising that PAPT teachers benefited to a larger extent in 1987 from support measures offered by the school boards than their CEQ colleagues had two years earlier.

Information obtained during pedagogical days and courses taken after working hours are the two support measures offered by the school boards for both the CEQ teachers in 1985 and the PAPT teachers in 1987.

The availability of a teacher-instructor and the distribution of written information on the educational use of the computer were of the same importance in both surveys. However, the presence of both a resource teacher who gives pedagogical support and a teacher-instructor is more frequent today.

According to both studies release time for teachers wanting to participate in training activities was most difficult to obtain.

TABLE 11: FACILITIES OR SERVICES OFFERED BY THE SCHOOL OR SCHOOL COMMISSION

FACILITIES OFFERED	PAPT 1987	CEQ 1985
Info during ped days	62%	42%
Avail. of written info on microcomputers	47%	35%
Avail. of release time for training	34%	20%
Avail. of access to consultants	46%	35%
Avail. of courses outside work hours	61%	55%
Avail. of resource teachers at your school	47%	27%

3.2 Educational Software

In the PAPT survey, the users' degree of satisfaction concerning each of the four aspects measured proved to be fundamentally different from the results obtained in the CEQ survey.

TABLE 12: LEVEL OF SATISFACTION WITH RESPECT TO VARIOUS ASPECTS OF EDUCATIONAL SOFTWARE. PROPORTION OF RESPONDENTS WHO INDICATED A GOOD OR EXCELLENT DEGREE OF SATISFACTION

ASPECTS	PAPT 1987	CEQ 1985
Info. available on content and objectives	51%	30%
Quantity available to suit your needs	46%	19%
Technical quality	82%	57%
Pedagogical quality	76%	42%

In 1985, 30% of CEQ users were satisfied with the available information on educational software, whereas, in 1987, this proportion reached 51% among PAPT users. In assessing availability of software for specific needs, 46% of PAPT users were satisfied compared to 19% of their CEQ colleagues. Since the question did not refer to any specific type of software, the answers take into account all types of software familiar to the respondents.

Although, the quantity of software available in English is greater than that in French, 1 out of 2 PAPT users still complain about the lack of software available for his/her needs and the lack of information on the software's content and objectives being covered. We could therefore question the pertinence of software produced outside of Quebec for pedagogical applications of our programmes.

The technical quality of educational software, the only aspect which satisfied a majority of users from the CEQ survey, was considered satisfactory by 82% of the PAPT users.

Finally, the pedagogical quality of the software, which barely satisfied 42% of the CEQ users, did not seem to be a problem for the PAPT users, with 76% stating that they were satisfied.

3.3 The Main Difficulties

The differences here are striking. Of the 17 difficulties listed, 12 had been selected by more than half of the users in the CEQ survey. Among the PAPT users, the majority mentioned only three of these difficulties: lack of time, insufficient number of computers and insufficient training and upgrading. These difficulties were not only the most significant to PAPT users, but were also most frequently mentioned by CEQ users.

The lack of training still mentioned by 54% of PAPT users, confirms the need for on-going training.

In both surveys, teachers indicated that they essentially faced the same basic difficulties. The lack of technical and pedagogical support can be added to the three factors noted above. The main difference between the PAPT and CEQ users is that more CEQ respondents faced these difficulties.

The only two difficulties more frequently stated by the PAPT users than those of the CEQ are the quality and capacity of the microcomputers. In fact, these microcomputers are not powerful enough (27% PAPT, 17% CEQ), or they are often out of order (26% PAPT, 20% CEQ). These are definite signs of aging equipment and of the rapid changes in the technology available on the market, perhaps, also, a value judgment on MAX 20 machines.

TABLE 13: DIFFICULTIES ENCOUNTERED BY USERS

DIFFICULTIES	PAPT 1987	CEQ 1985
Lack of time for use in classroom	60%	73%
Not enough microcomputers	57%	72%
Insufficient training	54%	68%
Lack of technical support	44%	67%
Lack of ped. support	41%	67%
Lack of interest by colleagues	40%	50%
Classes too large	39%	65%
Impossibility of modifying ed. software	36%	51%
Incompatibility of ed. software with new teaching methods	36%	51%
Not enough peripheral equipment	34%	53%
Lack of capacity of hardware	27%	17%
Hardware often out of order	26%	20%
Not enough operating manuals	24%	67%
Inappropriate location	23%	35%
Lack of interested administration	15%	20%
Inappropriate language of keyboard or manual	15%	52%
Lack of interest by students	10%	11%

4. CONCLUSION

In the last few years, considerable resources have been invested in the development of microcomputing. The Ministry's Implementation Plan has consolidated the school boards' initiatives and accelerated developments in this field.

The comparison of the 1985 findings with the 1987 PAPT results gives a good picture of the progress of the use of computers in education. Whether it is access to the machines or teacher training, the differences noted between the two studies are mostly linked to Ministry and school board initiatives rather than to basic differences between members of CEQ and the PAPT.

In fact, the main computer applications are the same in both inquiries, despite the larger number of trained teachers and users among PAPT members.

Observers of the development of educational computing feared that once teachers were motivated, they would exhaust the possible uses of computers after a few years and abandon their use, which would then increase their workload and change their teaching habits. Some also saw the Ministry's moratorium on subsidizing the purchase of equipment in 1986-1987 as a factor in discouraging users.

However, teachers' interest in eventually using the computer is constant and high in both studies. The interest of CEQ teachers in 1985 could have been seen as a passing excitement due to a novelty or a fad.

This is no longer the case in 1987. The PAPT teachers expressed the same interest two years later, although they were better able to understand what the pedagogical use of computers really meant because they had seen more of their colleagues using of computers than had those of the CEQ in 1985.

The opinion of teacher users is also quite clear and constant among CEQ and PAPT teachers. The computer was used in its pedagogical function in one or more disciplines and generally increased the effectiveness in teaching. Its use had a positive impact on students' motivation, on interest for the subject taught and on autonomy in learning.

The lack of time for using computers is closely related to the number available. It is easier to integrate computer activities in the schedule when students of a particular class have access to the machines at the same time.

Although important investments in equipment were made in the last years, the PAPT users still say, in 1987, that they do not have access to a sufficient number of computers. This is particularly pertinent for the future developments in CAI; even in those sectors that were ahead at the start of the Ministry's Plan, more than half of the users still had problems with the availability of hardware. Considering the high interest of teachers concerning the integration of the computer in their teaching, choices will have to be made in order to continuously finance new equipment.

In 1987-1988, the Ministry has proposed to the school board a formula whereby it would finance on a shared cost basis, the purchase of computers. This formula, while allowing the purchase of new computers, will also serve to replace broken down or obsolete machines. Perhaps this procedure will be renewed in the years to come.

In-service training was also judged as insufficient by a majority of PAPT users. This demonstrates the need for activities that would complement the basic courses currently available. Considering the rapid development of educational computing, these needs will certainly surface again in future years. Projects of local centers of expertise capable of insuring pedagogical leadership could answer the need for upgrading or continous training deemed necessary for the pedagogical integration of computers.

The PAPT findings indicate that a first phase, that of the basic Implementation Plan, is now complete. The next phase, that of the integration of computer use within each element of the curriculum, now begins. This phase will require extensive resources in terms of equipment and training.

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7. In the CEQ survey, the same problem occured. For instance, in the area of Saguenay-Lac St-Jean, the data obtained from the regional office showed that in January 1986, 20 teachers had completed a 10-day course. The CEQ data from this region indicates that 26 teachers (25.7% of the local sample) had taken these courses. The data collected overestimated the purpose of the "Light Training" courses. When answering this question, most respondents probably thought of their own training rather than that which was offered in the Ministry's course.

8. In the DTE-DGR survey of February 1986, the school boards were asked to state in terms of a percentage their contribution and that of the MEQ to the development of the educational use of computers in their area for each of the four following factors. The results are quite different between the francophone and anglophone sectors.

	French	English
Proportion of school boards contributing as much or more than the MEQ:	N=145	N=12
- to the purchase of equipment	33%	66%
- to the training of computer science teachers	75%	100%
- to the training of CAI	89%	100%
- to the purchase of software	47%	92%

Reference: MEQ, DTE, Document 55-0229